for the other antigens in the mixture. Measles vaccination is a recent innovation and deserves continuing study over a longer period of large-scale use. Probably smallpox vaccination demands most careful study of all. The incidence of complications is significant at certain age groups. Methisazone presents a feasible alternative in prevention once a case has arrived in the country, and there are arguments for the limitation of vaccination to those travelling to Canada from abroad. Very accurate surveillance of the complications of vaccination in this country and careful study of the experience of other countries such as Britain which have had recent introductions of smallpox from abroad are essential for the planning of future policies for smallpox vaccination.

We have won major victories with vaccines, but the story is not finished. Complacency must be avoided. There is a real danger that the public health officer is today so interested in his sociology and health education techniques, the epidemiologist in his punch cards and statistical significances, and the microbiologist in his molecular biology that all three regard current immunization methods as immutable and unworthy of further serious study. This is not so. Immunization requires constant attention by all three and regular modifications of policy based on their findings. In this way we may indeed provide more comprehensive insurance for our community at steadily decreasing premiums.

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CORRESPONDENCE

Letters are welcomed and will be published, if suitable, as space permits. They should be typewritten, double spaced.

PREVENTION OF RUBELLA EMBRYOPATHY

To the Editor:

Since the publication of Gregg's original observations[1] on congenital malformations following maternal rubella, a great body of evidence has accumulated relating these two factors and dealing with the epidemiology of the disease.

It is difficult to assess how great a part rubella plays in human malformation, since the disease occurs in both endemic and epidemic forms. During non-epidemic intervals rubella infections of the fetus produce between 2% and 5% of all congenital malformations.[2-6] During epidemic periods as many as half of the infants born alive following maternal infection with rubella in the first month of pregnancy are born with significant cardiovascular, neurological or ophthalmological defects.[8, 9] These are minimal incidence statistics, since the congenital defects may not be diagnosed for some time after birth and they can occur in pregnancies in which there was no apparent disease in the mother so that the association would not be suspected.[10, 11] As well as the morbidity produced by rubella there is a considerable fetal mortality; at least 18% of fetuses infected do not survive the pregnancy.[12] Clearly, rubella represents an extremely important cause of congenital malformation and fetal loss.

Although our understanding of the epidemiology and pathology of rubella embryopathy has greatly increased in recent years, there has been no significant reduction in its incidence or morbidity. The particular characteristics of rubella infection make affected patients difficult to identify until the disease has been infectious for some weeks, so that their isolation is impractical. Moreover, it is difficult to discover when a susceptible pregnant woman is exposed to rubella, since infectious patients are frequently well and not required to restrict their contact with the general population. An especially difficult situation exists in the case of infants born with rubella syndrome who may remain infectious for long periods after birth. Such infants probably form the reservoir of infection for a community.[13-15] A newborn infant with rubella syndrome can be a source of danger to a large number of young pregnant women, for example, in hospital personnel, in doctors' waiting rooms and in well-baby clinics. These facts demand consideration of means whereby this disease can be controlled.

The use of gamma globulin in preventing fetal damage, as recommended by several authorities,[16-20] is of unproved efficacy. Reports suggest that if it is to be used it should be given before maternal or fetal infection occurs. Therefore its usefulness is restricted to susceptible mothers who are exposed to rubella and in whom clinical evidence of the infection is not yet evident.[21] In this clinical context the obvious difficulty is the identification of an exposure, since many infectious patients do not have clinical evidence of the disease.

The only method of prevention is the production of active immunity in the susceptible population. Effective vaccines are not at present available although it is anticipated that they will be in the future.[22, 23] Currently there are two possible means of reducing the incidence of this disease. The first is to perform therapeutic abortion when it can be established that the fetus has been infected with rubella. It is now possible to demonstrate by immunological techniques and viral cultures the

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presence of acquired disease in pregnant women, and the statistical incidence of significant malformations in the fetuses can be predicted.[8, 24] However, a problem may arise from the medico-legal implications of terminating a pregnancy in which the fetus was not damaged by the infection. The second solution is to identify susceptible women and advise them to avoid situations where there is a greater possibility of being exposed to rubella infection. This means of coping with the problem can be implemented immediately.

Experience has shown that a history of rubella in individuals is unreliable in assessing their immune status.[7, 25] Fortunately, available laboratory techniques allow the identification of persons who are susceptible to rubella infection, specifically the neutralization antibody tests such as the hemagglutination inhibition test.[26, 27]

How frequently do we encounter a young married nurse who continues to work in the hospital nursery or some other area where she is exposed to these infants with rubella syndrome and who are excreting the living virus?[28] Many of these young women continue to work when they are pregnant. Surely such mothers, if they are susceptible to rubella infection, are exposing their own fetuses to an unreasonable risk. Other female hospital personnel may also be at risk. It is only reasonable and fair to inform these young women of the risk to the fetus in their work situation.

It is suggested that all women of child-bearing age should have their immune status to rubella disclosed by the hemagglutination inhibition test. Susceptible women should then be advised to avoid high-risk situations if they are pregnant or anticipating pregnancy. Infants with rubella embryopathy syndrome should be identified and isolated from pregnant women. Since these infants may be infectious for many months, some control of their mobility will be required after they leave hospital.

I hope this communication will stimulate medical and nursing professional organizations to study the problem of rubella embryopathy and congenital malformation and formulate additional recommendations for its prevention.

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DRUG COSTS

To the Editor:

The recent correspondence in the Journal on drug costs (*Canad. Med. Ass. J.*, 100: 440, 1969) is taking on a cantankerous and rather distressingly pseudostatistical overtone. The suggestion that the discovery of one usable drug by pharmaceutical firms represents an investment in research of seven million dollars and the method of calculation of this figure remind me of statistical manipulation, e.g. "If all the girls in Las Vegas were laid end to end—I shouldn't be at all surprised!"

I also cannot help feeling it is a little egregious of Dr. Wigle to suggest that the pharmaceutical industry "has probably done more for mankind through the saving of lives and relief of suffering in the past 30 years than any other industry in history". He is arbitrarily abrogating to the pharmaceutical industry all the advances in pharmacology and biochemistry that have occurred in the past generation. The age of miracles is no more due to one industry than it is due to one discipline or to one man.

The pharmaceutical industry is suggesting that the development of new drugs is largely dependent upon the present financial structure of the industry in Canada. I would sincerely like to know the answer to this question: Does Canada with its system of financial reward to pharmaceutical manufacturers produce more useful drugs than countries that do not have this system but are of a comparable development? I would suggest that this is in fact the crux of the situation. I do not feel that Dr. Wigle is justified in being surprised at the attitude towards pharmaceutical manufacturers. If he will remember they have been under a great cloud of suspicion for a very long time. While Canada is not the United States, nevertheless the senatorial committee that investigated drug costs